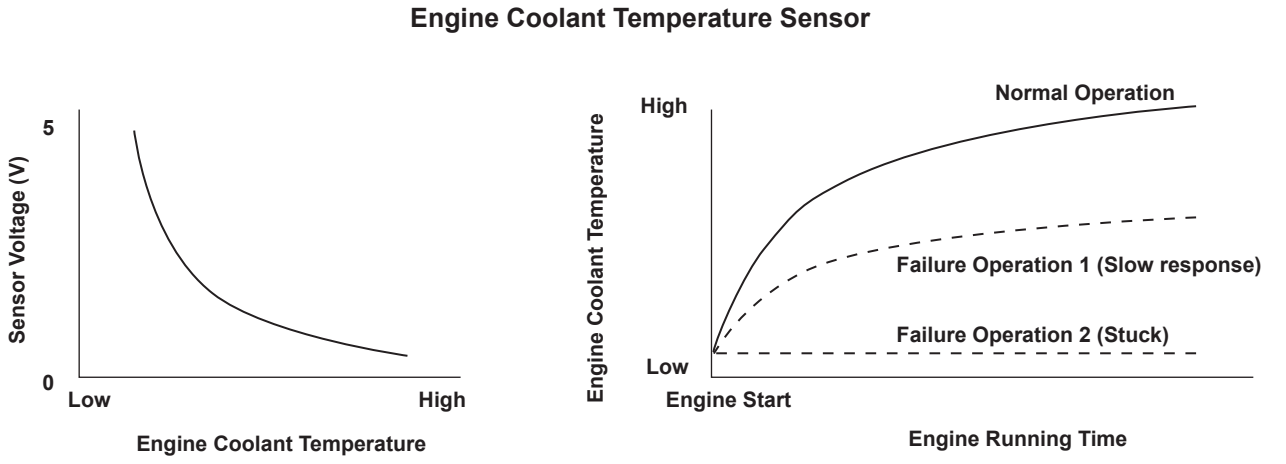
DTC P0116: Engine Coolant Temperature (ECT) Sensor Circuit Range/ Performance Problem



P0116-9673

General Description

The engine control module (ECM)/powertrain control module (PCM) supplies voltage to the engine coolant temperature (ECT) signal circuit (about 5 V) through a pull-up resistor. As the engine coolant cools, the ECT sensor resistance increases, and the ECM/PCM detects a high signal voltage. As the engine coolant warms, the ECT sensor resistance decreases, and the ECM/PCM detects a low signal voltage. The ECM/PCM detects a malfunction if either of the following conditions is met.

Malfunction determination 1: Slow response

If the ECT output voltage does not reach a specified temperature at which the closed-loop control for stoichiometric air/fuel ratio starts within a predetermined time period depending on the initial coolant temperature after starting the engine, the ECM/PCM detects a malfunction and a DTC is stored.

Malfunction determination 2: Stuck

If the ECT output voltage does not change a specified value or more within a set time period after starting the engine, the ECM/PCM detects a malfunction and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	1,200 seconds or less
DTC Type	Two drive cycles, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Initial engine coolant temperature	20ºF (-6ºC)*	86ºF (30ºC)*
	—	19ºF (-7ºC)**
Initial intake air temperature	20ºF (-6ºC)*	—
	—	19ºF (-7ºC)**
Fuel feedback	Other than during fuel cut-off operation	
No active DTCs	ECM/PCM, Primary HO2S*1, Primary HO2S Heater*1, A/F Sensor*2, A/F Sensor Heater*2, MAP, CKP, ECT, TP, TDC, CYP, IAT*1, EGR, BARO, IAC*1, VTEC System, Fuel System, Misfire	

* : Applies to Malfunction determination 1 (slow response).
** : Applies to Malfunction determination 2 (stuck).
*1: F23A1, F23A5 engines
*2: F23A4 engine

Malfunction Threshold

Malfunction determination 1 (slow response):
The engine running time before the engine coolant temperature reaches 86°F (30°C) for the initial engine coolant temperature and load is as follows.
The MAP value is 49 kPa (371 mmHg, 14.6 in.Hg) at an engine speed of 1,000 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	68ºF (20ºC)
Engine running time	300 seconds or more	90 seconds or more

The MAP value is 33 kPa (250 mmHg, 9.8 in.Hg) at an engine speed of 1,500 rpm.

Initial engine coolant temperature	19ºF (-7ºC)	68ºF (20ºC)
Engine running time	360 seconds or more	120 seconds or more

Malfunction determination 2 (stuck):
- The engine coolant temperature is less than 86°F (30°C) when the engine running time is 1,200 seconds if the MAP value is a set value or more (see the table), or the ECT sensor output voltage varies by 60 mV or less from the initial output voltage within 1,200 seconds.
- The ECT sensor output voltage varies by 60 mV or less from the initial output voltage within 1,200 seconds if the MAP value is a set value or less (see the table).

Engine speed	1,000 rpm	1,500 rpm
MAP value	48 kPa (360 mmHg, 14.2 in.Hg)	31 kPa (234 mmHg, 9.2 in.Hg)

Driving Pattern

1. Start the engine at an engine coolant temperature and intake air temperature as specified under Enable Conditions.
2. Let it idle until the engine coolant temperature reaches a set value, or for at least 20 minutes.

Diagnosis Details

Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle with the ECT and IAT at engine start-up within the specified temperature range, a Temporary DTC is stored in the ECM/PCM memory. If the malfunction recurs during the next (second) drive cycle with the ECT and IAT at engine start-up within the specified temperature range, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.